

1. An improved optical configuration suited to the monitoring of a process
2 flow through the wall of a containment vessel, comprising:
an optical path including a window extending through and sealed to the wall of
4 the containment vessel; and
an optical surface disposed in the optical path associated with minimizing
6 aberration, increasing numerical aperture, or both.
2. The improved optical configuration of claim 1, wherein:
2 the window has a surface facing into the process flow and a surface facing away from the
process flow; and
4 the surface facing away from the process flow is associated with minimizing
aberration or increasing numerical aperture.
3. The improved optical configuration of claim 1, further including:
2 a lens disposed outside the containment vessel and in the optical path; and
wherein the window has a surface facing into the process flow and a surface
4 facing the lens which is associated with minimizing aberration or increasing numerical
aperture.
4. The improved optical configuration of claim 3, wherein the surface of the
2 window facing the lens is substantially spherical.
5. The improved optical configuration of claim 3, wherein the arrangement
2 of the lens and window is such that light rays of the optical path are generally normal to
the surface of the window facing the lens.
6. The improved optical configuration of claim 1, including a sapphire
2 window.

7. An improved optical configuration suited to the monitoring of a process
2 flow through the wall of a containment vessel, comprising:
an optical path including a window extending through and sealed to the wall of
4 the containment vessel;
a lens disposed in the optical path outside the vessel, the window and lens
6 cooperatively minimizing aberration, increasing numerical aperture, or both.
8. The improved optical configuration of claim 7, wherein:
2 the window has a surface facing into the process flow and a surface facing the
lens which is associated with minimizing aberration or increasing numerical aperture.
9. The improved optical configuration of claim 8, wherein the surface of the
2 window facing the lens is substantially spherical.
10. The improved optical configuration of claim 8, wherein the light rays of
2 the optical path are generally normal to the surface of the window facing the lens.
11. The improved optical configuration of claim 7, including a sapphire
2 window.